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Ricin

Ricin Fact Sheet

Regions for Statewide Disease Investigation / Terrorism Response

Disease Case Report (CD-1)

Ricin Case Investigation Form (under development)

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Ricin

Overview

Ricin is a potential bioterrorism weapon. If you suspect that you are dealing with a bioterrorism situation, immediately contact your [Senior Epidemiology Specialist for the region](#), or the Department of Health and Senior Service's Situation Room (DSR) at 800-392-0272.

Ricin is a toxic poison that can be made from the waste left over from processing castor beans. It would take a deliberate act of terrorism to use Ricin toxin to poison people. Ricin toxin can be inhaled in a powder or mist form. It can also be injected into the body, or ingested in contaminated food or water. Ricin is highly toxic, with as little as 500 micrograms needed to cause death when ingested in food or water, or injected into the body. Much higher levels of the toxin are needed to cause death when inhaled.

Case Definition

Ricin Ingestion or Injection

Clinical Description

Injection with, or ingestion of Ricin toxin may result in the following symptoms:

- Following ingestion, nausea, vomiting, and abdominal pain can occur in a few hours or less.
- Acute onset of fever.
- Internal bleeding in the stomach and intestines.
- Vomiting blood and bloody stools.
- Muscle and lymph node soreness near an injection site.
- Cessation of function of the liver, kidneys, and spleen.
- Death may occur within 36 to 72 hours from multiple organ failures.

Diagnosis and Laboratory Criteria

- Because of the rapid time frame to severe symptoms and death (36 to 72 hrs.), laboratory testing may not be an effective tool in the diagnosis of the initial case(s) of Ricin poisoning.
- Rapid progression to severe symptoms and death (which is unusual with infectious agents) can occur, so clinical signs and symptoms are critical in establishing a diagnosis of Ricin intoxication (as well as chemical agent exposure).
- Serum and respiratory secretions should be submitted for antigen detection (ELISA and/or ECL).
- Acute and convalescent sera can provide retrospective diagnosis.
- Nonspecific laboratory findings may include leukocytosis.



Case Classification

Confirmed: a clinically compatible case that is laboratory confirmed.

Presumptive: a clinically compatible case that is epidemiologically linked to a specific place and/or time Ricin was believed to have been released.

Ricin Inhalation

Clinical Description

Inhalation of significant amounts of Ricin may result in the following symptoms:

- Acute onset of symptoms may occur as early as 4 – 8 hours after exposure.
- Coughing (may be severe).
- Fever and arthralgias.
- Tightness in the chest.
- Difficulty breathing.
- Airway necrosis.
- Acute pulmonary edema in the lungs.
- Severe respiratory distress.
- Death may occur within 36 to 72 hours from hypoxemia.


Diagnosis and Laboratory Criteria

- Acute lung injury in large numbers of geographically clustered patients may suggest exposure to aerosolized Ricin (although other biological toxins, biological and chemical agents would also need to be considered).
- Because of the rapid time frame to severe symptoms and death, laboratory testing may not be an effective tool in the diagnosis of the initial case(s) of Ricin intoxication.
- Rapid progression to severe symptoms and death (which is unusual with infectious agents), can occur, so clinical signs and symptoms are critical in establishing a diagnosis of Ricin intoxication (as well as chemical agent exposure).
- Serum and respiratory secretions should be submitted for antigen detection (ELISA and/or ECL).
- Acute and convalescent sera can provide retrospective diagnosis.
- Nonspecific laboratory and radiographic findings may include leukocytosis and bilateral interstitial infiltrates.
- Endoscopic evaluation may reveal necrotizing suppurative lesions in conjunction with tracheitis and bronchitis/bronchiolitis.

Case Classification

Confirmed: a clinically compatible case that is laboratory confirmed.

Presumptive: a clinically compatible case that is epidemiologically linked to a specific place and/or time Ricin was believed to have been released.

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Information Needed for Investigation:

Verify the diagnosis. What are the patient's clinical signs and symptoms? What laboratory tests were conducted? What were the results?

Establish the extent of illness. Are there other individuals with similar signs/symptoms (includes household and other close contacts)? Characterize information by person, place, and time. Information may be obtained by talking with patients, health care workers, and emergency workers, etc.

Determine the form of the illness as soon as possible.

- Acute onset, with fever and coughing, chest tightness, dyspnea, and arthralgias occurs 4 to 8 hours, or more after inhalational exposure.
- Acute onset of fever, with nausea, vomiting, and abdominal pain can occur in a few hours or less. Internal bleeding in the stomach and intestines. Vomiting blood and bloody stools, after ingestion or injection of Ricin.
- With injection you may also observe muscle and lymph node soreness near an injection site.

Determine the source of the exposure to prevent other cases.


- Assist patients with identifying possible exposure sources. (Inhalation, Ingestion or Injection).
- If the patient exhibits inhalational form of exposure, determine the recent locations that the patient has visited.
- If ingestion of Ricin is indicated as the source of exposure, obtain a history of food and water consumption, if available obtain samples of the suspected food or water source.
- If injection is suspected as the source of exposure, find out where and when the injection was given and by whom?
- Have there been other cases linked by time, place or person?

Notification and Control Measures:

- **Contact the Senior Epidemiology Specialist for the region, or the Department of Health and Senior Service's Situation Room (DSR) at 800-392-0272 (24/7) immediately upon learning of a suspected case of Ricin.**
- Contact the Bureau of Child Care (573-751-2450) if cases are associated with a childcare facility.
- Contact the Section for Long-term Care Regulation (573-526-0721) if cases are associated with a long-term care facility.
- Contact the Bureau of Health Facility Regulation (573-751- 6303) if cases are associated with a hospital or hospital-based long-term care facility.

Control Measures

- See USAMRIID's Medical Management of Biological Casualties Handbook (The Blue Book) pages 65-67.

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- There are currently no vaccines or prophylactic antitoxin available for Ricin. Management of exposures should be supportive care that may include treatment for pulmonary edema. Gastric lavage and cathartics are indicated for ingestion of Ricin.
- No person-to-person transmission of Ricin. Standard infection control practices (i.e., standard precautions) should be observed.
- Decontaminate with soap and water. A hypochlorite solution of 0.1% sodium hypochlorite can inactivate Ricin.
- You may contact the regional poison control center for additional clinical guidance. (800)-222-1222.

General Information:


- By other routes of exposure, Ricin is not a direct lung irritant; however, intravascular injection can cause minimal pulmonary perivascular edema due to vascular endothelial injury. Ingestion causes necrosis of the gastrointestinal epithelium, local hemorrhage, and hepatic, splenic, and renal necrosis. Intramuscular injection causes severe local necrosis of muscle and regional lymph nodes with moderate visceral organ involvement.
- An attack with aerosolized Ricin would be primarily diagnosed by the clinical and epidemiological setting. Acute lung injury affecting a large number of geographically clustered cases should raise suspicion of an attack with a pulmonary irritant such as Ricin, although other pulmonary pathogens could present with similar signs and symptoms. Other biological threats, such as SEB, Q fever, Tularemia, Plague, and some chemical warfare agents like phosgene, need to be included in the differential diagnosis.
- Ricin-induced pulmonary edema would be expected to occur much later (1-3 days post exposure) compared to that induced by SEB (about 12 hours post exposure) or phosgene (about 6 hours post exposure). Ricin intoxication would be expected to progress despite treatment with antibiotics, as opposed to an infectious process. There would be no mediastinitis as seen with inhalation anthrax. Ricin patients would not be expected to plateau clinically as occurs with SEB intoxication.

Laboratory Procedures

Specimens:

Contact the State Public Health Laboratory for instructions on collection and transport of specimens for Ricin testing.

Specific ELISA and ECL testing on serum and respiratory secretions, or immunohistochemical stains of tissue may be used where available to confirm the diagnosis. Ricin is an extremely immunogenic toxin, and paired acute and convalescent sera should be obtained from survivors for measurement of antibody response. PCR can detect castor bean DNA in most Ricin preparations. Additional supportive clinical or diagnostic features after aerosol exposure to Ricin may include the following: bilateral infiltrates on chest radiographs, arterial hypoxemia,

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neutrophilic leukocytosis, and a bronchial aspirate rich in protein compared to plasma which is characteristic of high permeability pulmonary edema.⁽²⁾

WARNING: *Ricin is highly toxic and persistent in the environment. Do not attempt to collect environmental samples unless you are trained and equipped to do so.* See the NIOSH emergency response card for Ricin, available at:
<http://www.bt.cdc.gov/agent/ricin/erc9009-86-3.asp>.

Reporting Requirements

Ricin is a Category IB disease and suspected cases should be reported to the local health authority or to the Missouri Department of Health and Senior Services immediately, by telephone, facsimile or other rapid communication.


1. For confirmed and probable cases, complete a “Disease Case Report” (CD-1).
2. For each case, gather information needed to complete a “Ricin Investigation Report” (under development).
3. Entry of the completed CD-1 into MOHSIS negates the need for the paper CD-1 to be forwarded to the Regional Health Office.
4. Send the completed secondary investigation form to the Regional Health Office.
5. All outbreaks or “suspected” outbreaks must be reported as soon as possible (by phone, fax, or e-mail) to the Regional Communicable Disease Coordinator. This can be accomplished by completing the Missouri Outbreak Surveillance Report (CD-51).
6. Within 90 days from the conclusion of an outbreak, submit the final outbreak report to the Regional Communicable Disease Coordinator.

References

1. Centers for Disease Control and Prevention (CDC). Public Health Emergency Preparedness & Response, “Frequently Asked Questions (FAQ) About Ricin”,
<http://www.bt.cdc.gov/agent/ricin/faq/index.asp>, (8/03).
2. USAMRIID’S Medical Management of Biological Casualties Handbook, 4th ed., Fort Detrick, Frederick, Maryland, 02/2001, 76-79,
<http://www.usamriid.army.mil/education/bluebook.html>, (8/03).

Other Sources of Information

1. Missouri Department of Health & Senior Services, Emergency / Terrorism Response, Information for Medical and Public Health Professionals, Selected References, “Ricin”
http://www.dhss.state.mo.us/BT_Response/MedicalProfessionals.htm - Ricin (8/03).
2. U.S. Army Medical Research Institute of Chemical Defense Chemical Casualty Care Division, Medical Management of Chemical Casualties Handbook, 3rd ed., Aberdeen Proving Ground, MD, 08/1999, <http://www.vnh.org/CHEMCASU/titlepg.html>, (8/03).
3. Mirarchi, FL and M Allswede, “CBRNE – Ricin”, eMedicine Journal, January 8 2003, V 4, N 1, <http://author.emedicine.com/emerg/topic889.htm> (8/03).

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4. Franz, DR and NK Jaax, “Chapter 32 – Ricin Toxin” in Medical Aspects of Chemical and Biological Warfare. 1997.
<http://www.nbc-med.org/SiteContent/HomePage/WhatsNew/MedAspects/Ch-32electrv699.pdf>
 (8/03).
5. Centers for Disease Control and Prevention (CDC), NIOSH Emergency Response Card - Ricin. 23 April 2002. <http://www.bt.cdc.gov/agent/ricin/erc9009-86-3.asp> (8/03).

Ricin

FACT SHEET

What is Ricin?

Ricin is a poison that can be made from the waste leftover from the processing of castor beans. It can be in a powder, mist, or pellet form, or it can be dissolved in water. It is a stable substance not affected by extreme temperature conditions. Depending on the route of exposure, as little as 500 micrograms of Ricin can cause death within 36 to 72 hours, usually from multiple organ failure.

How can Ricin be spread?

It would take a deliberate act to make Ricin and use it to poison people. Ricin may be ingested if put in food or water. Ricin may be inhaled as people breathe in a mist or powder form. Ricin pellets may be dissolved in a liquid and injected into people. Persons poisoned by Ricin are not contagious.

What are the symptoms of Ricin poisoning?

Depending on the route of entry into the body, Ricin can have different kinds of symptoms. If ingested or injected, you may see an onset of fever, internal bleeding in the stomach and intestines, nausea and vomiting of blood, bloody stools and muscle and lymph node soreness near an injection site. If inhaled you may see onset of fever, severe coughing, tightness in the chest leading to difficulty breathing, and the accumulation of fluid in the lungs. Symptoms appear within a few hours of exposure and death may occur within 36 to 72 hours.

What is the treatment for Ricin poisoning?

There is no antidote for Ricin. Ricin poisoning is treated by giving the patient supportive care to minimize the effects of the poisoning. Depending on the route of exposure, supportive care could include assisting the patient with breathing, gastric lavage, intravenous fluids, and medications to treat swelling.

What can people do if they think they may have been exposed to Ricin?

Notify your health care provider immediately, and follow their directions. Contact the Missouri Department of Health and Senior Services immediately (24/7) at **(800) 392-0272**. The regional poison control center may be contacted at: (800)-222-1222.

**Missouri Department of Health and Senior Services
Section for Communicable Disease Prevention
Phone: (866) 628-9891 or (573) 751-6113**

MISSOURI DEPARTMENT OF HEALTH & SENIOR SERVICES

Division of Environmental Health & Communicable Disease Prevention

Regions for Statewide Disease Investigation / Terrorism Response



Patrick Franklin, ES* (816) 350-5442

Northwest Region Health Office

3717 S. Whitney Ave.

Independence, MO 64055

(816) 350-7691 FAX

TB Control

Lynn Tennon, RN (573) 840-9733

(573) 840-9727 FAX

C. Jon Hinkle, SES (816) 632-7276

Cameron Area Health Office

207 East McElwain

Cameron, MO 64429

(816) 632-1636 FAX



Barbara Wolkoff, SES (573) 526-3613

Jo Ann Rudroff, ES* (573) 751-6309

Central Region Health Office

930 Wildwood

Jefferson City, MO 65109

(573) 526-0235 FAX

TB Control

Lynelle Phillips, RN (573) 751-6498

David Oeser (573) 751-6411

statewide alternate for TB

(573) 526-0235 FAX



Doug Dodson, SES (314) 877-2830

Cindy Butler, SES* (314) 877-2857

Eastern Region Health Office

220 South Jefferson

St. Louis, MO 63103

(314) 877-2882 FAX

TB Control

Lynn Tennon, RN (573) 840-9733

(573) 840-9727 FAX



Diane Smith, RN, SES (417) 895-6945

Ray Van Ostran, ES* (417) 895-6931

Southwest Region Health Office

1414 West Elfindale

Springfield, MO 65807

(417) 895-6975 FAX

TB Control

Lynn Tennon, RN (573) 840-9733

(573) 840-9727 FAX



Sharon Merideth, RN, SES (573) 840-9108

Pat Gargac, RN, ES* (573) 840-9734

Southeast Region Health Office

2875 James Boulevard

Poplar Bluff, MO 63901

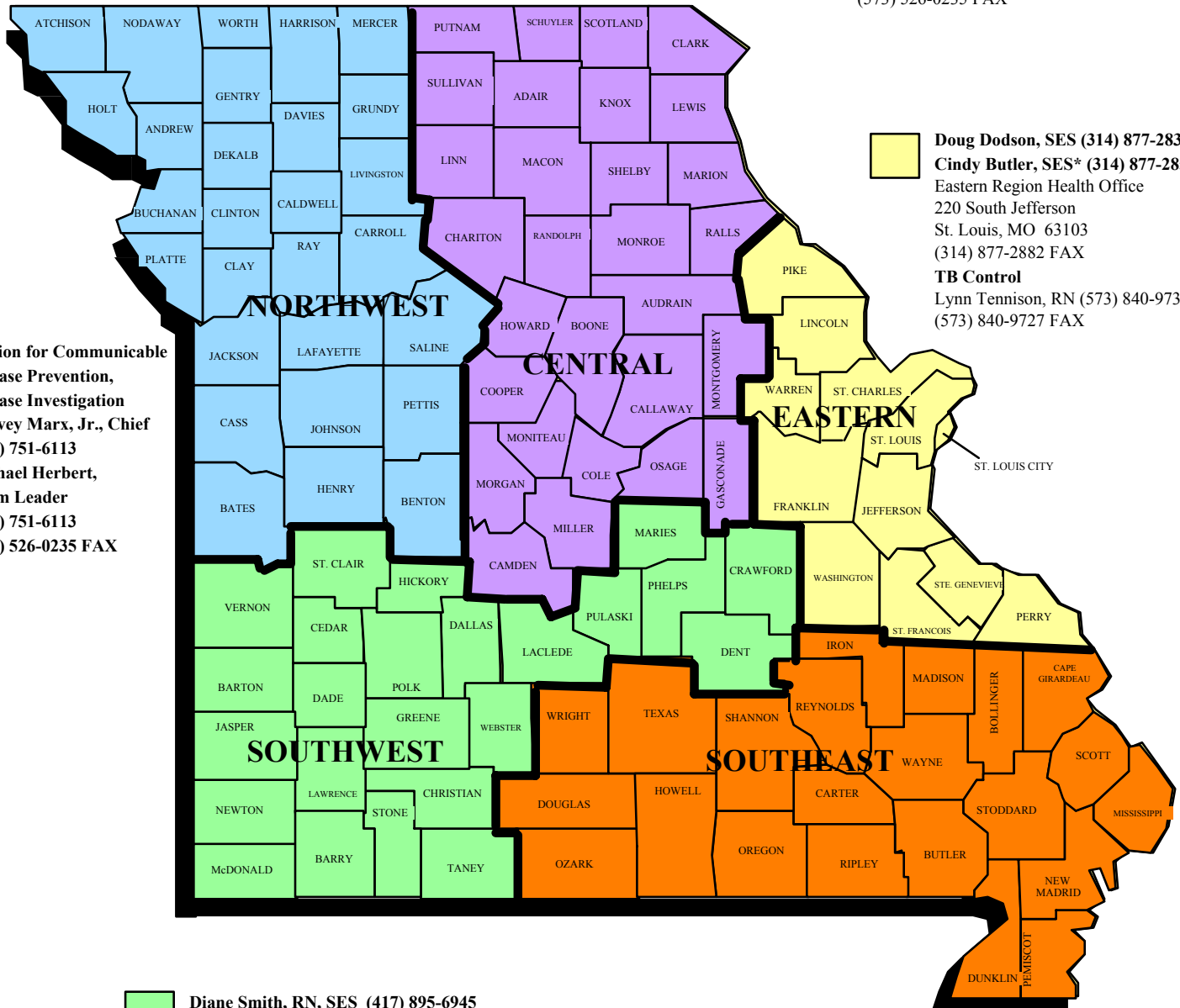
(573) 840-9727 FAX

TB Control

Lynn Tennon, RN (573) 840-9733

(573) 840-9727 FAX

**Section for Communicable
Disease Prevention,
Disease Investigation
Harvey Marx, Jr., Chief
(573) 751-6113
Michael Herbert,
Team Leader
(573) 751-6113
(573) 526-0235 FAX**



Asterisk (*) denotes Regional Communicable Disease Coordinator

[Return to Ricin Section](#)



MISSOURI DEPARTMENT OF HEALTH AND SENIOR SERVICES
DISEASE CASE REPORT

REPORT TO LOCAL PUBLIC HEALTH AGENCY

1 DATE OF REPORT ____ / ____ / ____		2 DATE RECEIVED BY LOCAL HEALTH AGENCY ____ / ____ / ____	
3 NAME (LAST, FIRST, M.I.)		4 GENDER <input type="checkbox"/> MALE <input type="checkbox"/> FEMALE	5 DATE OF BIRTH ____ / ____ / ____
6 AGE ____		7 HISPANIC <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN	
8 RACE (CHECK ALL THAT APPLY) <input type="checkbox"/> BLACK <input type="checkbox"/> ASIAN <input type="checkbox"/> PACIFIC ISLANDER <input type="checkbox"/> WHITE <input type="checkbox"/> AMERICAN INDIAN <input type="checkbox"/> UNKNOWN		9 PATIENT'S COUNTRY OF ORIGIN ____	
10 DATE ARRIVED IN USA ____ / ____ / ____		11 ADDRESS (STREET OR RFD, CITY, STATE, ZIP CODE)	
12 COUNTY OF RESIDENCE		13 TELEPHONE NUMBER ()	
14 PREGNANT <input type="checkbox"/> YES (IF YES NUMBER OF WEEKS ____) <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN		15 PARENT OR GUARDIAN	
16 RECENT TRAVEL OUTSIDE OF MISSOURI OR USA <input type="checkbox"/> YES <input type="checkbox"/> NO IF YES, WHERE ____		17 DATE OF RETURN ____ / ____ / ____	

18 OCCUPATION		19 SCHOOL/DAY CARE/WORKPLACE		ADDRESS (STREET OR RFD, CITY, STATE, ZIP CODE)	
20 WORK TELEPHONE NUMBER ()		21 OTHER ASSOCIATED CASES <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN IS REPORT PART OF AN OUTBREAK <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN		22 TYPE OF COMPLAINT/OUTBREAK <input type="checkbox"/> FOODBORNE <input type="checkbox"/> WATERBORNE <input type="checkbox"/> OTHER (SPECIFY) ____	
23 WAS PATIENT HOSPITALIZED <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN		24 PATIENT RESIDE IN NURSING HOME <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN		25 PATIENT DIED OF THIS ILLNESS <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN	
26 CHECK BELOW IF PATIENT OR MEMBER OF PATIENT'S HOUSEHOLD (HHLD):		PATIENT		HHLD MEMBER	
		YES NO UNK		YES NO UNK	
27 NAME OF HOSPITAL/NURSING HOME		IS A FOOD HANDLER			
28 HOSPITAL/NURSING HOME ADDRESS (STREET OR RFD, CITY, STATE, ZIP CODE)		ATTENDS OR WORKS AT A CHILD OR ADULT DAY CARE CENTER			
29 REPORTER NAME		30 TELEPHONE NUMBER ()		IS A HEALTH CARE WORKER	
31 REPORTER ADDRESS (STREET OR RFD, CITY, STATE, ZIP CODE)		32 TYPE OF REPORTER/SUBMITTER <input type="checkbox"/> PHYSICIAN <input type="checkbox"/> OUTPATIENT CLINIC <input type="checkbox"/> PUBLIC HEALTH CLINIC <input type="checkbox"/> HOSPITAL <input type="checkbox"/> LABORATORY <input type="checkbox"/> SCHOOL <input type="checkbox"/> OTHER ____			
33 ATTENDING PHYSICIAN/CLINIC NAME		ADDRESS (STREET OR RFD, CITY, STATE, ZIP CODE)		34 TELEPHONE NUMBER ()	

35 DISEASE NAME(S)	36 ONSET DATE(S) ____ / ____ / ____ ____ / ____ / ____	37 DIAGNOSIS DATE(S) ____ / ____ / ____ ____ / ____ / ____	38 DISEASE STAGE/ RISK FACTOR	39 PREVIOUS DISEASE/STAGE	40 PREVIOUS DISEASE DATE(S) ____ / ____ / ____ ____ / ____ / ____
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41 - DIAGNOSTICS

TEST DATE (MO/DAY/YR)	TYPE OF TEST	SPECIMEN TYPE	COLLECTION DATE (MO/DAY/YR)	QUALITATIVE / QUANTITATIVE RESULTS	REFERENCE RANGE	LABORATORY NAME/ADDRESS (INCLUDE STREET OR RFD, CITY, STATE, ZIP CODE)

42 - TREATMENTS

TREATED (Y/N/UNK)	REASON NOT TREATED	TYPE OF TREATMENT	DRUG	DOSAGE	TREATMENT DATE (MO/DAY/YR)	TREATMENT DURATION (IN DAYS)	PREVIOUS TREATMENT	PREVIOUS LOCATION (LIST CITY, STATE)

43 - SYMPTOMS

SYMPTOM (IF APPLICABLE)	SYMPTOM SITE (IF APPLICABLE)	SYMPTOM ONSET DATE (MO/DAY/YR)	SYMPTOM DURATION (IN DAYS)

44 COMMENTS

NOTES FOR ALL RELEVANT SECTIONS:

- Stages, risk factors, diagnostics, treatments, and symptoms shown below are examples. To see a more complete listing, please go to <http://www.dhss.state.mo.us/Diseases/DDwelcome.htm>. You may also contact the Office of Surveillance at 1-800-392-0272 for additional information or to report a case.
- All dates should be in Mo/Day/Year (01/01/2001) format.
- All complete addresses should include city, state and zip code.
- Required fields referenced below are italicized and bold, however fill form as complete as possible.

(1) **Date of Report** -- date sent by submitter of document.

(2) Date received will be filled in by receiving agency.

(3-8) **CASE DEMOGRAPHICS/IDENTIFIERS:** *Last name, First Name*, Gender, *Date of Birth*, Hispanic, Race - please check all that apply

(23) Was patient hospitalized due to this illness?

(32) Type of reporter/submitter (doctor, nursing home, hospital, laboratory) (33-34) Attending physician or clinic (full physician name and degree, address, phone)

DISEASE: (35) *Disease name or name(s)*, (36) *Onset date(s)*, (37) *Diagnosis Date(s)*

(38) Disease Stage or Risk Factor**Syphilis**

Primary (chancre present)
Secondary (skin lesions, rash)
Early Latent (asymptomatic < 1 year)
Late Latent (over 1 year duration)
Neurosyphilis
Cardiovascular
Congenital
Other

Gonorrhea or Chlamydia

Asymptomatic
Uncomplicated urogenital (urethritis, cervicitis)
Salpingitis (PID)
Ophthalmia/conjunctivitis
Other (arthritis, skin lesions, etc)

TB Infection

Contact to TB case
Immunocompromised
Abnormal CXR
Foreigner/Immigrant
IV Drug/Alcohol Abuse
Resident, correctional
Employee, correctional
Over 70
Homeless
Diabetes
Healthcare worker
Converter/2 yrs ≥ 10
Converter/2 yrs ≥ 15

(39) *Previous Disease/Stage (if applicable)* (40) *Previous Disease Dates (if applicable)*

(41) Diagnostics (Please Attach Lab Slip)**Test Type****Hepatitis**

Igm Anti-HBc
Anti-HBs
Anti-HBc Total
Igm Anti-HAV
HBsAg
Hep C

TB

Not Done
Mantoux
Multiple puncture device
X-Ray
Smear
Culture

Other

Elisa
Western Blot
Culture
ALT
AST

Specimen Type (blood, urine, CSF, smear, swab), **Collection Date** (Mo/Day/Yr), **Qualitative** (negative, positive, reactive), **Quantitative Results** (1:1, 2.0 mm reading,) **Reference Range** (1:1neg, 1:64 equivocal, 1:128 positive, > 2 positive), **Laboratory** (name, address)

(42) TREATMENT**Reason not treated**

False positive
Previous treated
Age

Drug**TB**

Isoniazid
Ethambutol
Pyrazinamide
Rifampin

(43) SYMPTOMS:

Symptom (jaundice, fever, dark urine, headache) **Symptom Site** (head, liver, lungs, skin), **Symptom Onset Date** (Mo/Day/Yr) and **Symptom Duration** (in days)

(44) **Comments:** Attach additional sheets if more comments needed.